The following five indicators (5.5 -5.9) should be selected as appropriate to a particular course for additional content and depth:

C-5.5 Analyze the energy changes involved in calorimetry by using the law of conservation of energy as it applies to temperature, heat, and phase changes (including the use of the formulas $q = mc\Delta T$ [temperature change] and $q = mLv$ and $q = mLf$ [phase change] to solve calorimetry problems). (additional content/depth)

Revised Taxonomy Level 4 Analyze conceptual knowledge

Students did not address this concept in physical science

It is essential for students to

- Differentiate between the terms temperature and heat in terms of the Kinetic Molecular Theory
- Understand the terms
  - gram specific heat
  - molar specific heat
  - heat of fusion
  - heat of vaporization
- Solve problems involving the heat required (or released) when a substance undergoes any combination of temperature and phase change.
- Solve problems involving the heat transferred from one substance to another when the two substances reach thermal equilibrium.
  - Determine the temperature change and the phase of each substance upon reaching equlibrium.

Assessment

The revised taxonomy verb for this indicator is analyze, which means to "break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose". In this case, students should be able to consider a the energy changes that a substance or system of substances must experience in order to go from one phase and/or temperature to another. Because the indicator is written as conceptual knowledge, assessments should require that students understand the "interrelationships among the basic elements within a larger structure that enable them to function together."